

Contextual stress and physical environmental toxins linked to urban childhood asthma: Independent and synergistic effects

Rosalind J. Wright, M.D., M.P.H.

Associate Professor of Medicine

Harvard Medical School

*Respiratory, Environmental & Genetic
Epidemiology*

Channing Laboratory

Brigham and Women's Hospital

Boston, MA

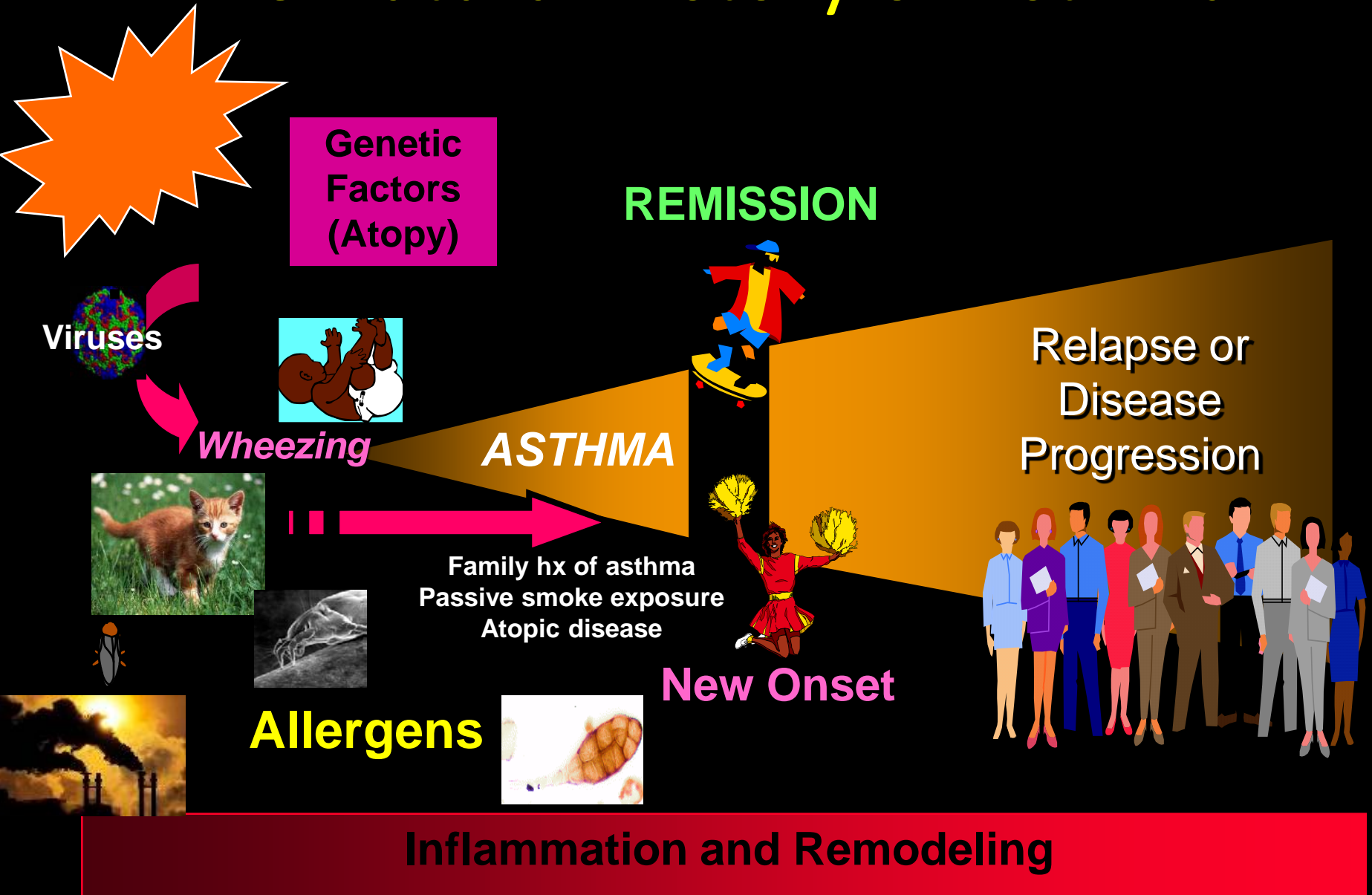


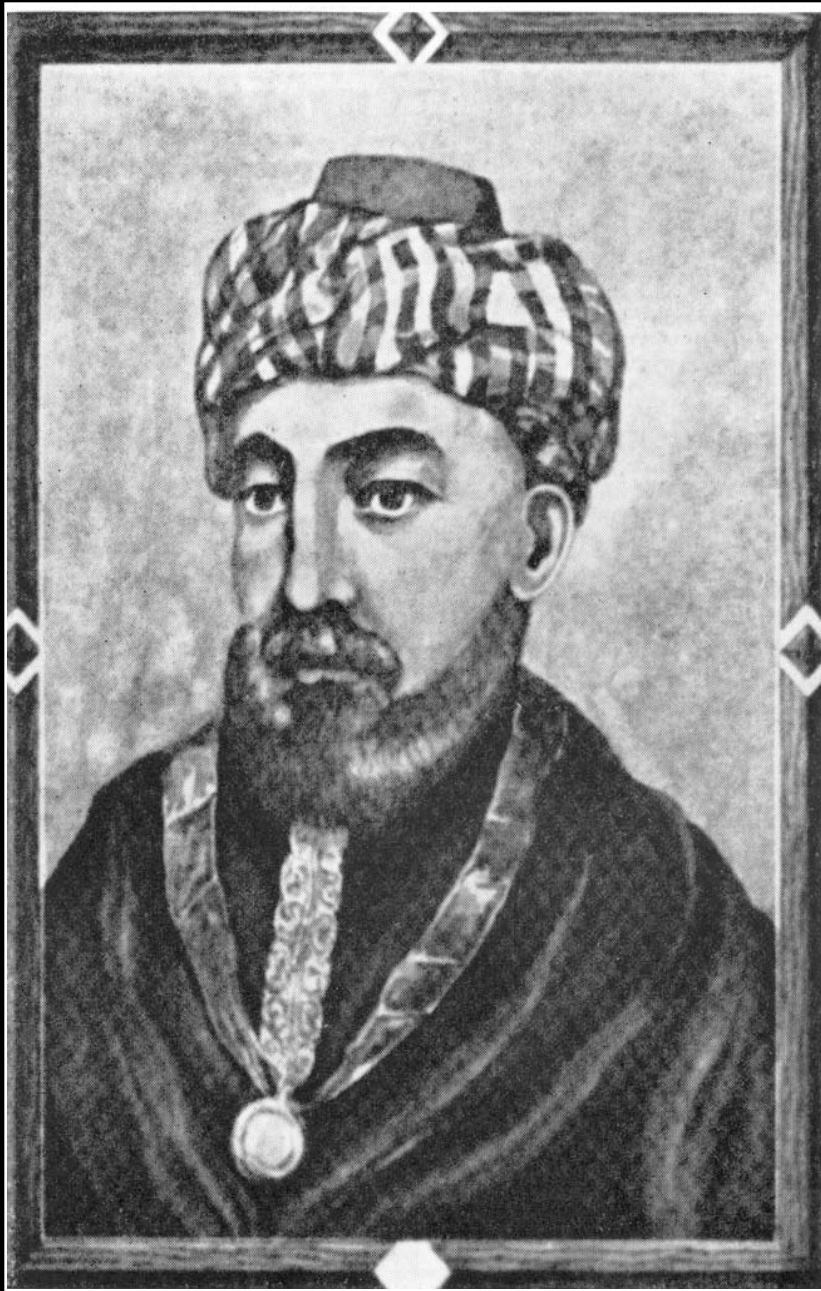
**BRIGHAM AND
WOMEN'S HOSPITAL**



**HARVARD
MEDICAL SCHOOL**

The Natural History of Asthma





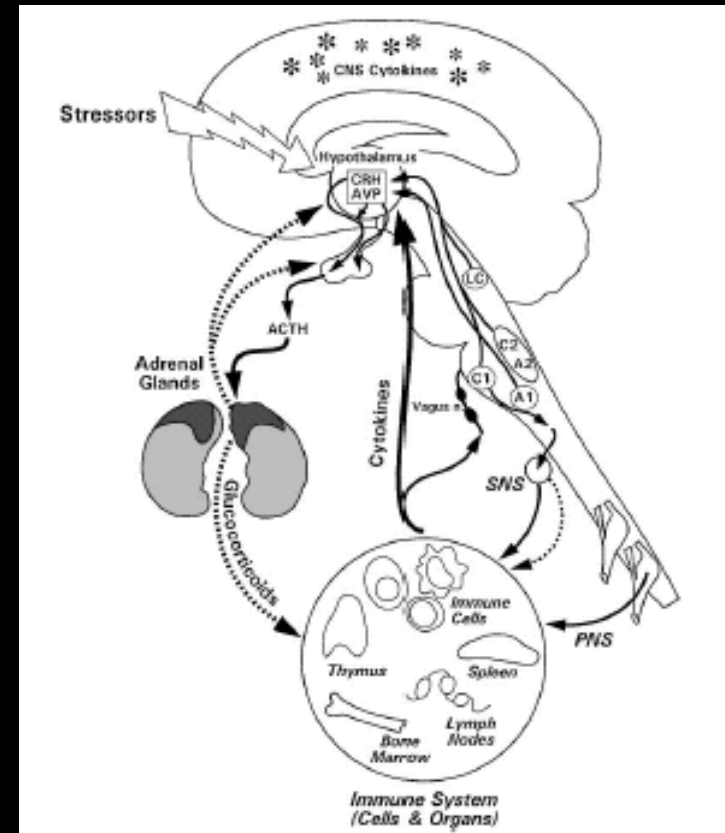
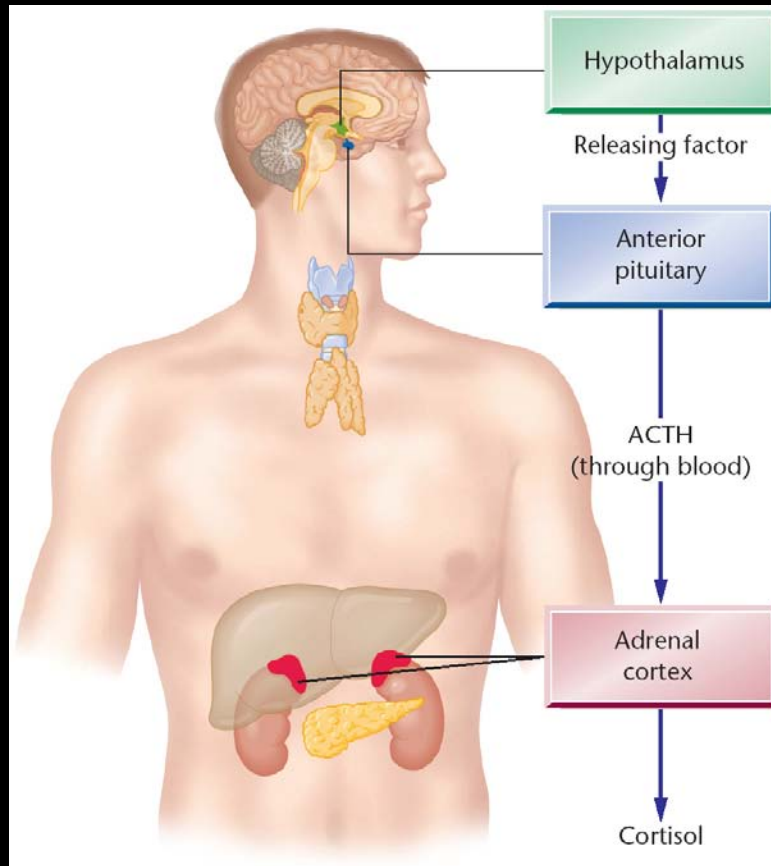
Noted that mental suffering impairs physical well-being and adversely affects the respiratory organs; and this was universally known in the 12th century

.. 'the success of relieving the patient depends largely on an intimate knowledge of the *total* patient.'

Treatise on Asthma

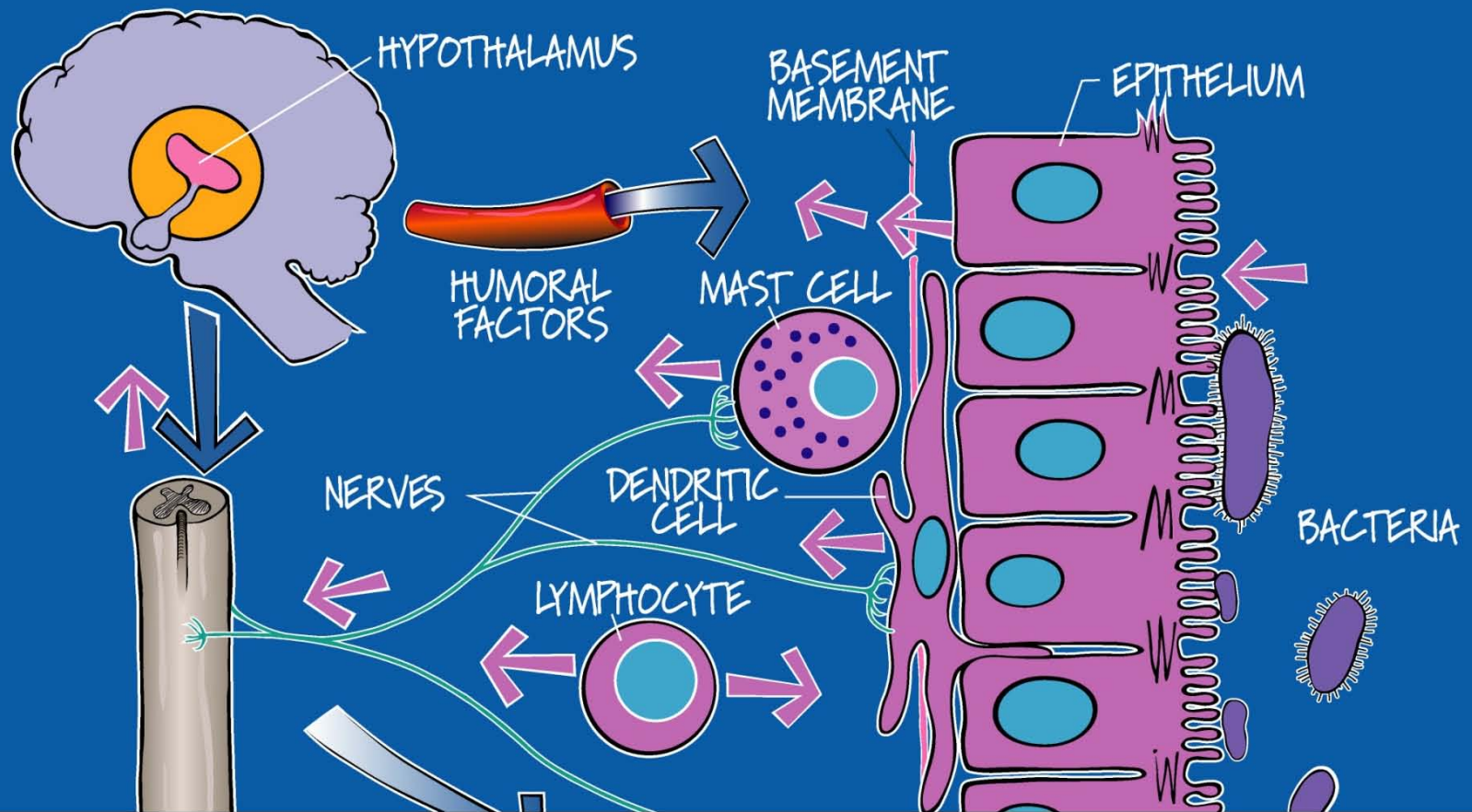
Maimonides
Rabenu Moshe Ben Maimon
(1135 - 1204)

Neuroendocrine - Immune Interactions



- Sympathetic-Adrenomedullary (SAM) System
- Hypothalamic-Pituitary-Adrenocortical (HPA) System

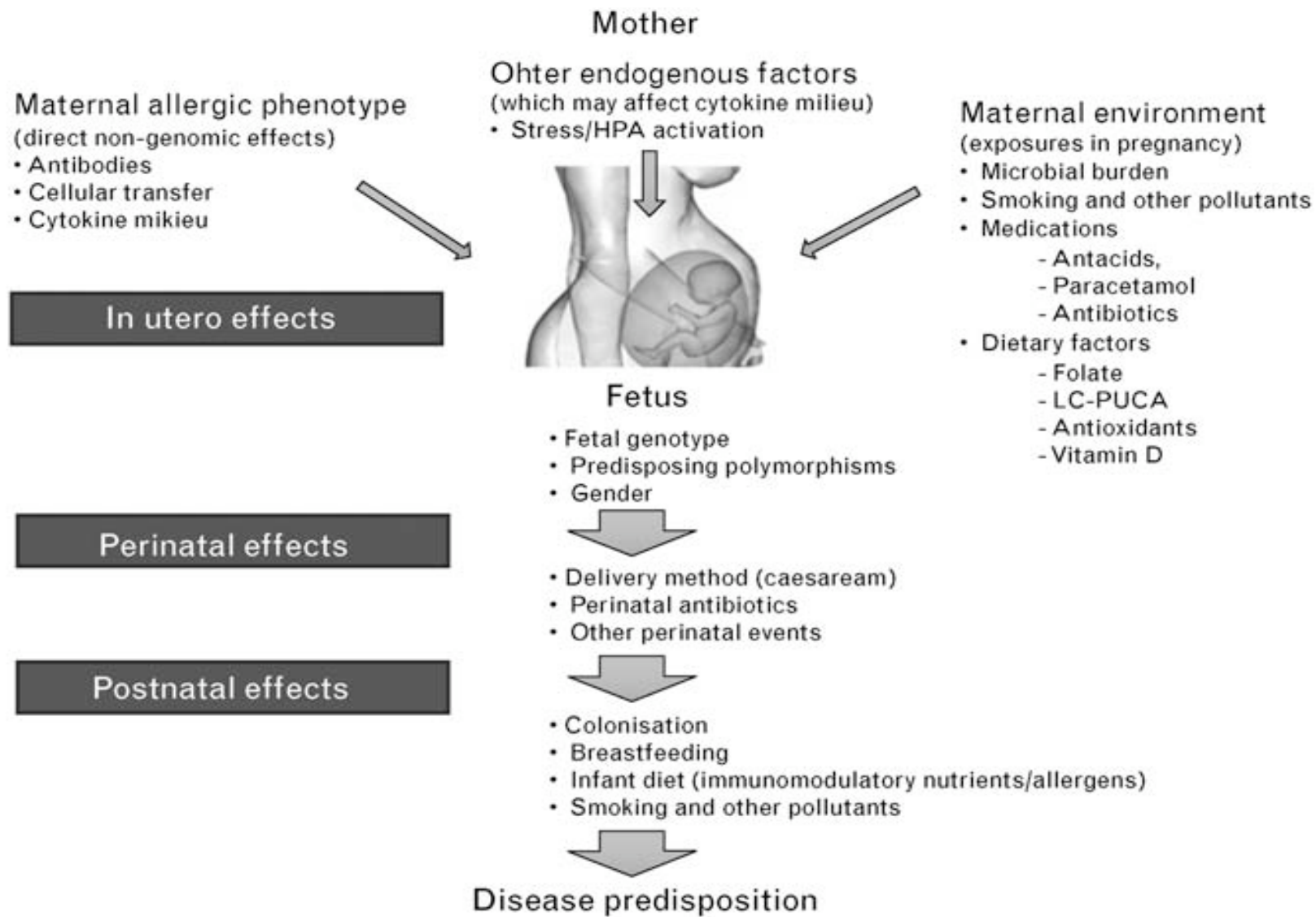
These systems are regulated in the brain



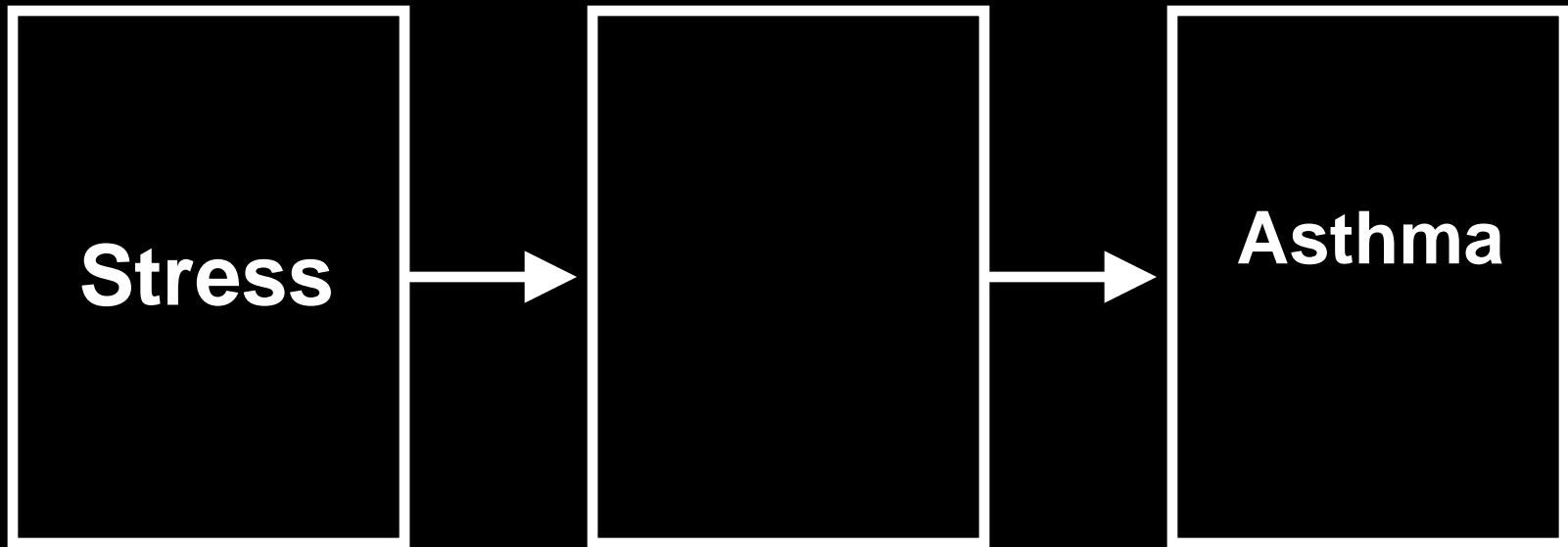
Wright et al., Thorax 1998; 53:1066-74
 Wright et al., JACI 2005; 5:23-9
 Wright RJ, Bio Psychol 2010 [Epub ahead of print]

SPINAL CORD

Materno-fetal interaction in pregnancy



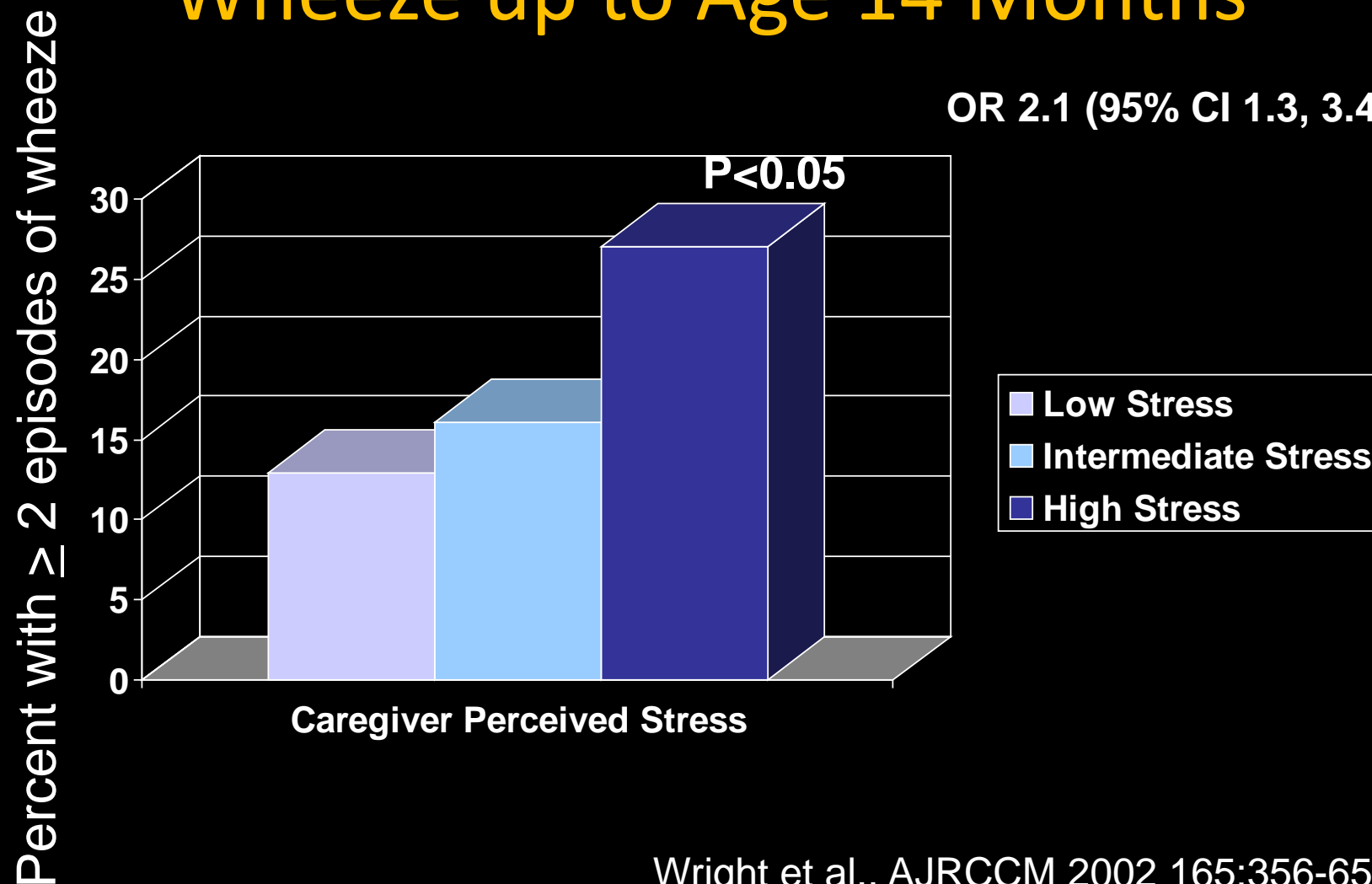
Black Box Model of Stress and Asthma Epidemiology



Can differential life stress experiences contribute to health disparities?

Caregiver Stress and Repeated Wheeze up to Age 14 Months

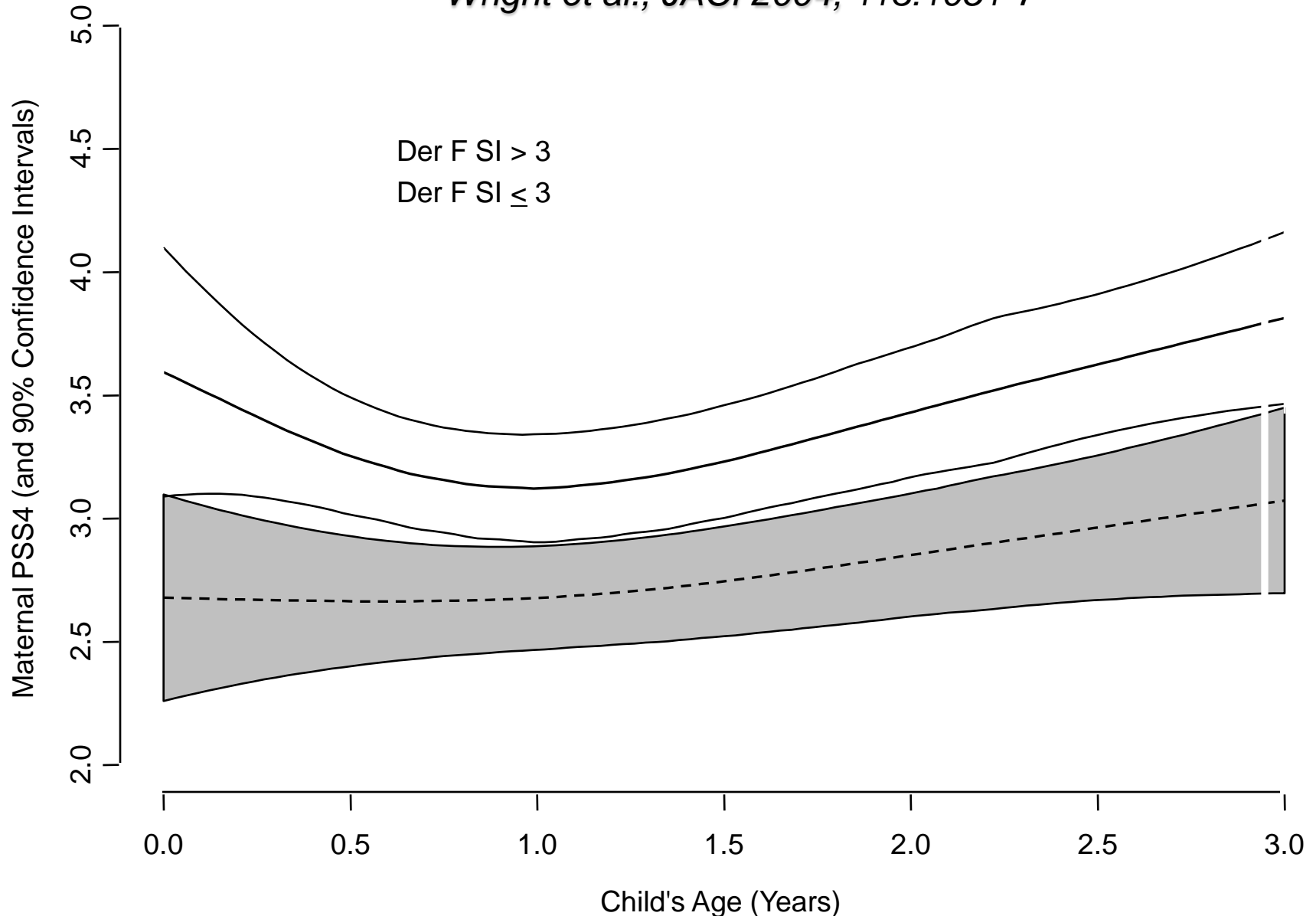
OR 2.1 (95% CI 1.3, 3.4)



Wright et al., AJRCCM 2002 165:356-65

Mean Caregiver Stress Over Time: Comparing High to Low Lymphocyte Proliferative Response to Der f 1

Wright et al., JACI 2004; 113:1051-7



Analysis also controls for race, active maternal asthma, and cold status.



**Air
Pollution**

**Tobacco
Smoke**

Stress

Allergens



NIEHS, NICHD, NHLBI, NIMH

Wright RJ, et al. Ciencia & Salude Coletiva 2008; 13:1729-42

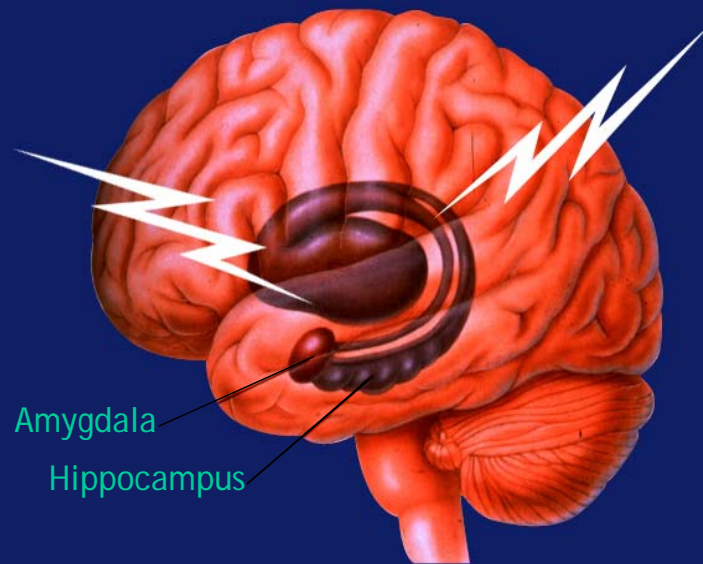
Stress is Normative

- **At some point, we all encounter major life stress, and daily we manage more minor stress**
 - **Daily hassles**
 - Late for appointment, no parking space, elevator slow to arrive....
 - **Chronic Stress**
 - Constant money worries, marital problems, caring for chronically ill spouse or child....
 - **Major Life Stress**
 - Death of loved one, break up of significant relationship, serious accident, natural disaster

Trauma – Candidate Stressor

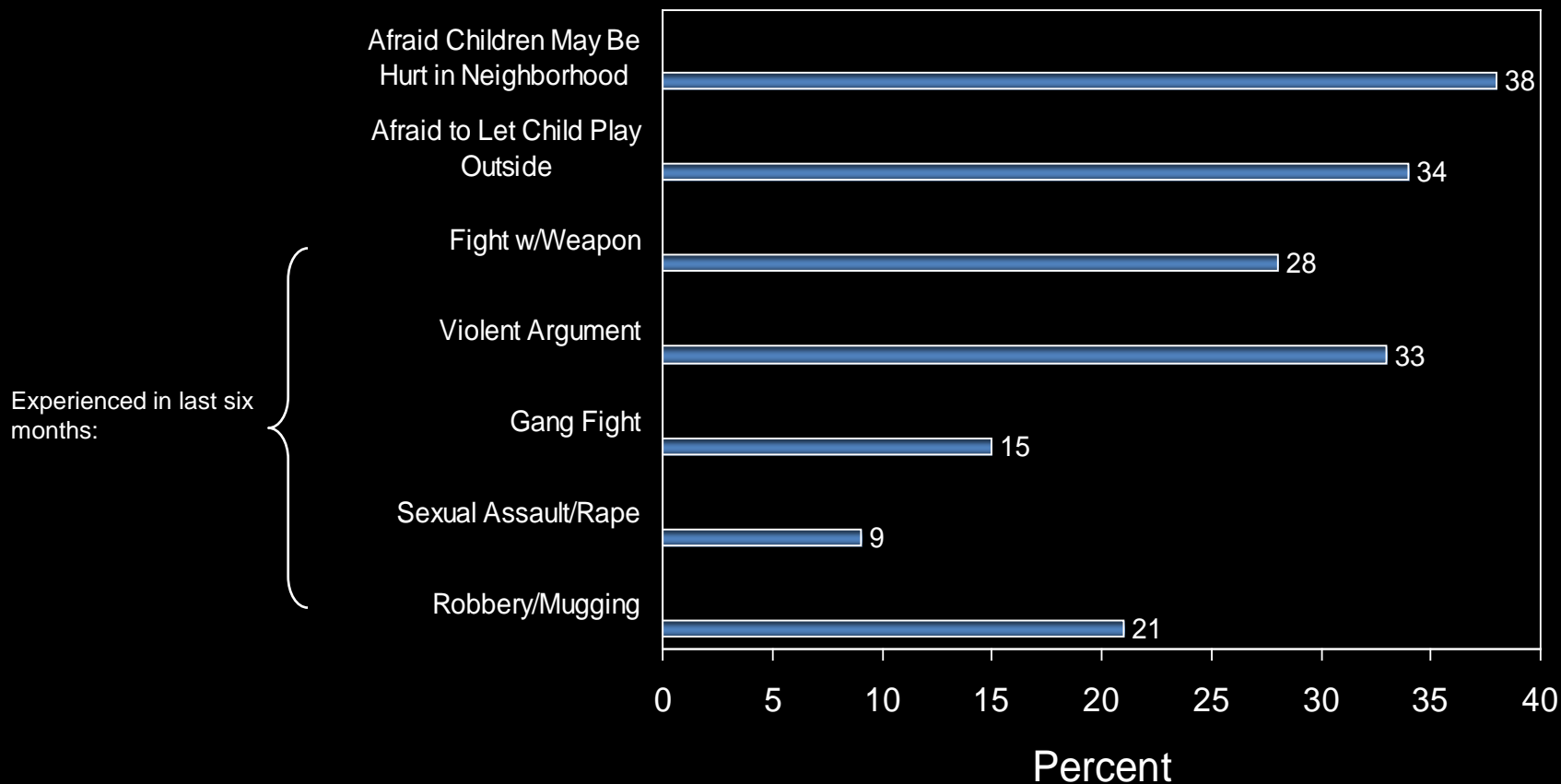
Not normative

Memory - Strong Emotions



More facts of nature: All forest animals, to this very day, remember exactly where they were and what they were doing when they heard that Bambi's mother had been shot.

Caretaker Exposure to Violence (ICAS)



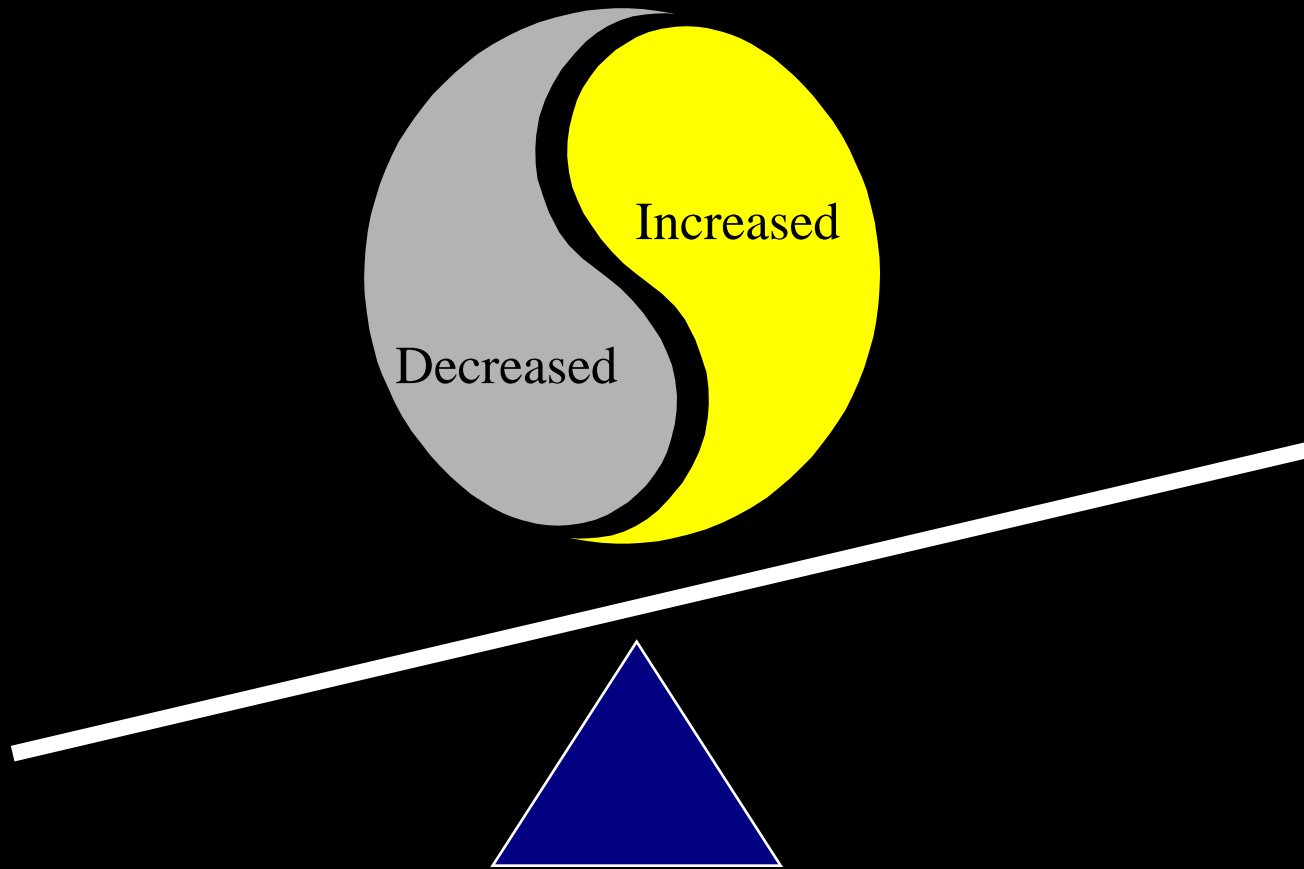


Children Reflect What They See - ?physiologically

Stress Domains

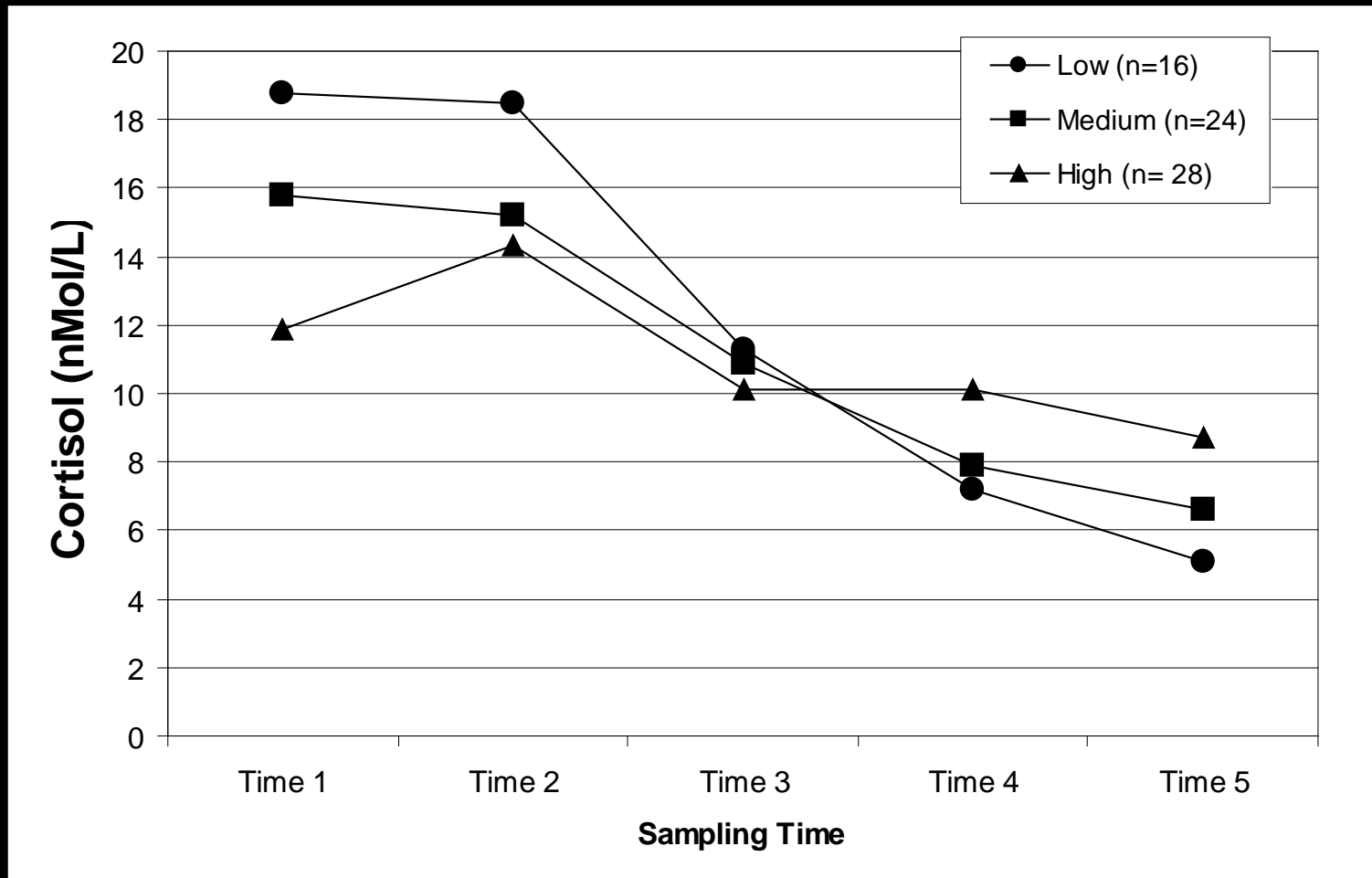
- Financial strain
- Racism/discrimination
- Interpersonal violence
- Community violence
- Other negative life events (housing, landlords, fear of eviction, etc.)

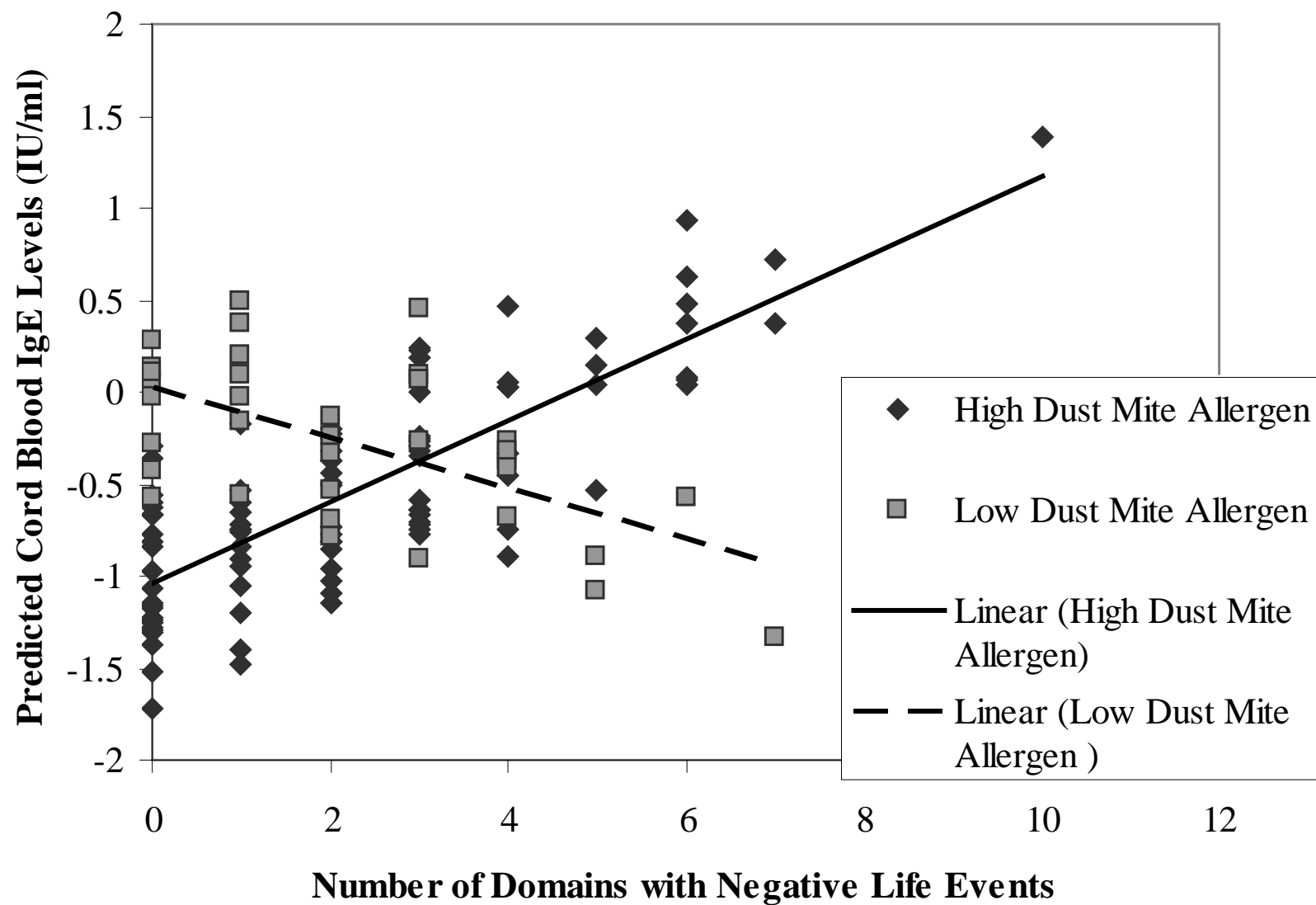
Cortisol in Health and Disease



Stress is an endocrine disruptor

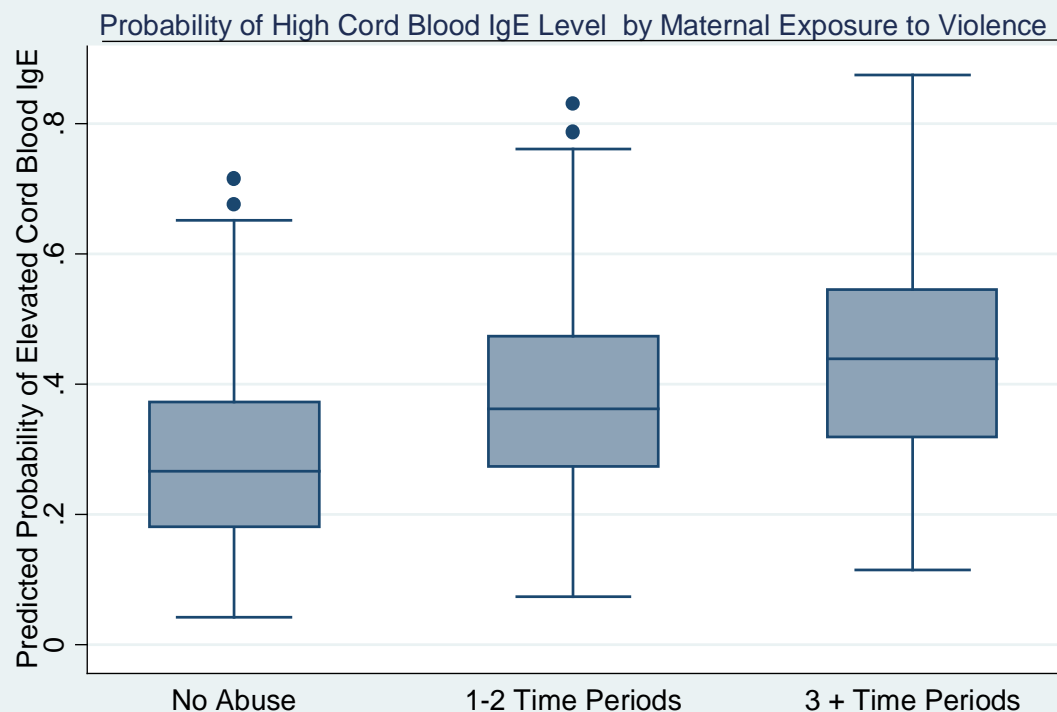
Preliminary Cortisol Analyses





Maternal interpersonal trauma and cord blood IgE levels in an inner-city cohort: A life-course perspective

Michelle Judith Sternthal, PhD,^a Michelle Bosquet Enlow, PhD,^b Sheldon Cohen, PhD,^c Marina Jacobson Canner, MA,^d John Staudenmayer, PhD,^e Kathy Tsang, MHA,^d and Rosalind J. Wright, MD, MPH^{a,d} *Boston and Amherst, Mass, and Pittsburgh, Pa*



Note: All probabilities are based on adjusted, log transformed cord blood IgE scores. Trend significant at $p < .01$. High IgE = .77 IU/mL & above.

During early childhood the human stress system is under strong social regulation

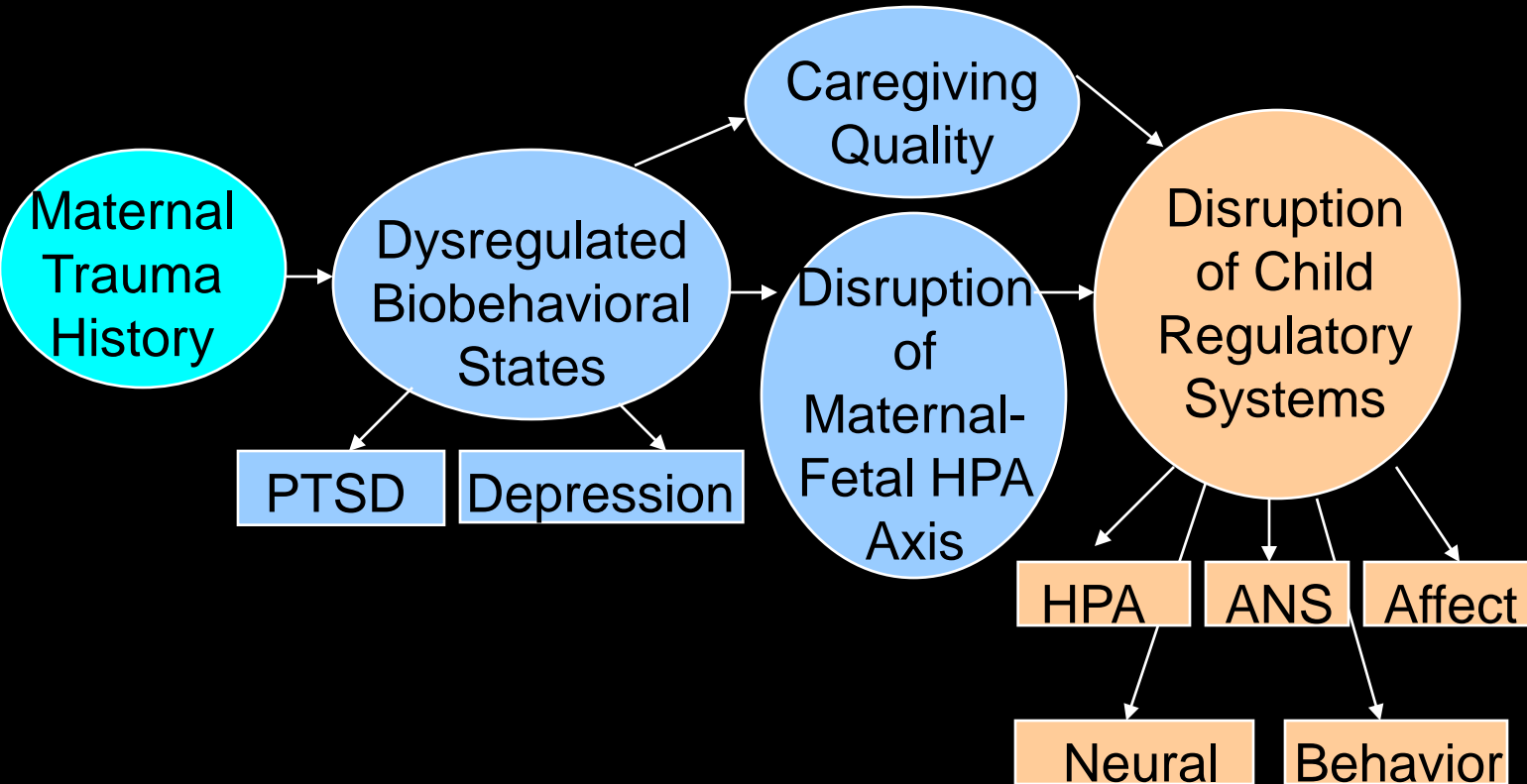


Sensitive, responsive, supportive care “buffers” or protects young children from experiencing elevated stress hormone levels

As quality of care decreases, young children become highly stress vulnerable



Specific Model



Sample

- 50 mother-infant dyads to date
 - primarily low-income
 - racial/ethnic background

	White	Black	Asian	Multi-racial
Non-Hispanic	18%	36%	4%	8%
Hispanic	20%	6%	0%	8%

- From Project ACCESS (PI RJ Wright)
- Lifetime trauma exposure
 - 84% \geq 1 Criterion A event(s)
 - consistent with studies with similar samples
 - $M = 2.7$ events, range 0-10
 - large majority prior to pregnancy

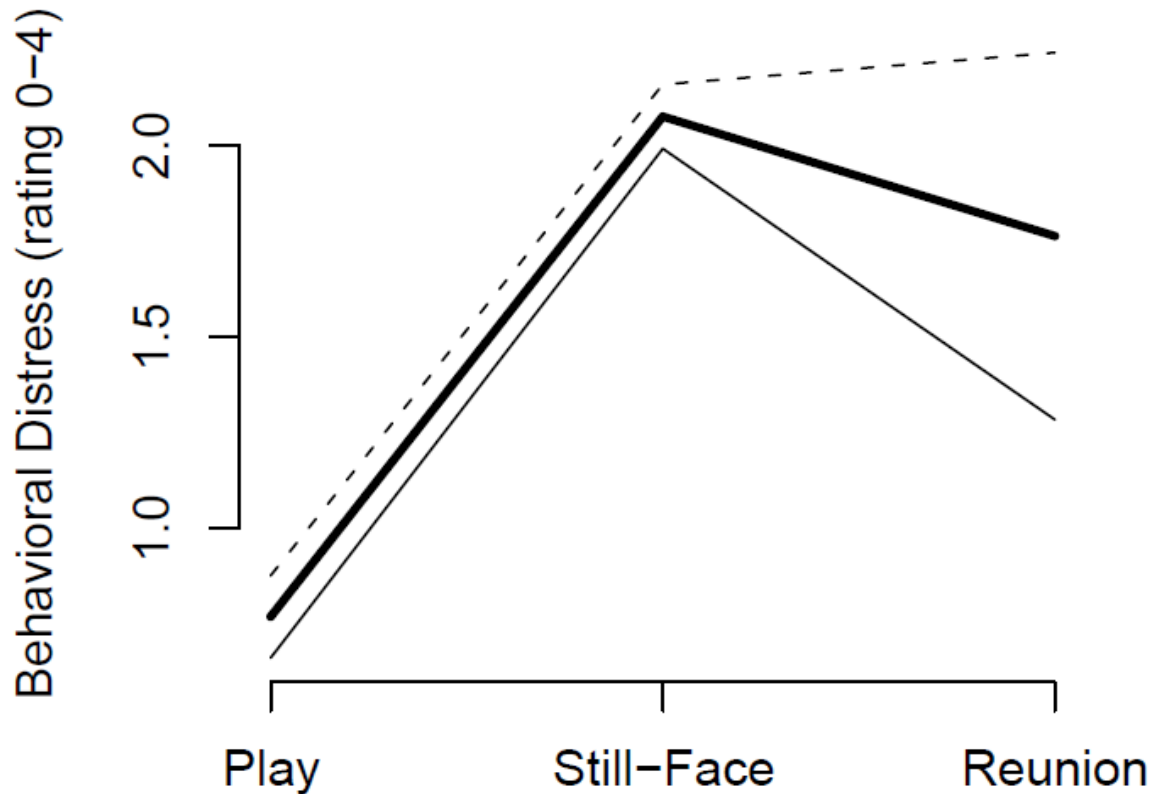
LifeShirt System: Autonomic Reactivity



Dyadic Regulation

- Still-Face Paradigm (SFP)
 - standardized dyadic stressor (Tronick et al., 1978)
- Repeated version (2 min each)
 - Play (baseline)
 - Still-Face 1 (stressor)
 - Reunion 1 (recovery)
 - Still-Face 2 (stressor)
 - Reunion 2 (recovery)

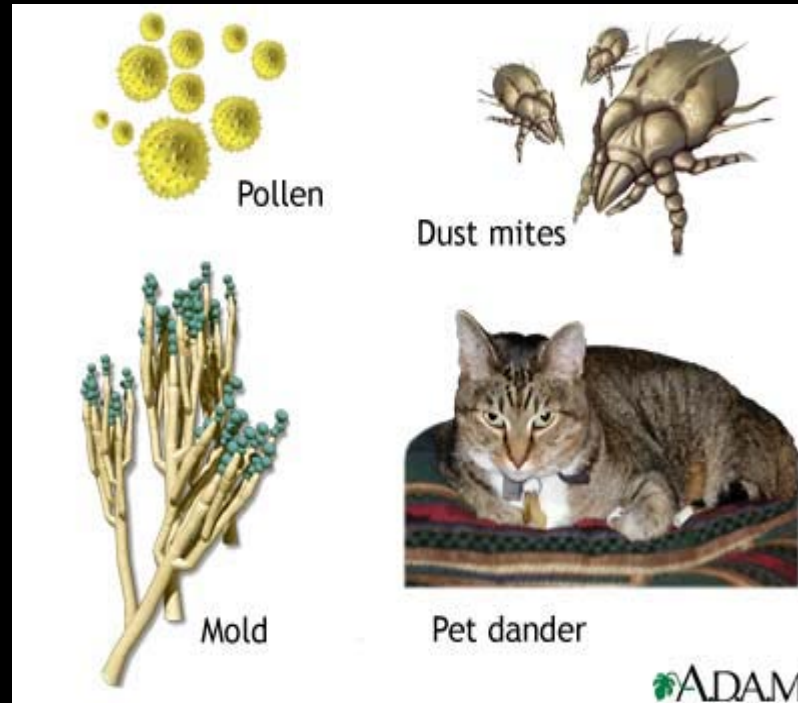
SFP: Infant Distress Recovery



Maternal Lifetime
Trauma Exposure

- High Exposure
- Moderate Exposure
- Low Exposure

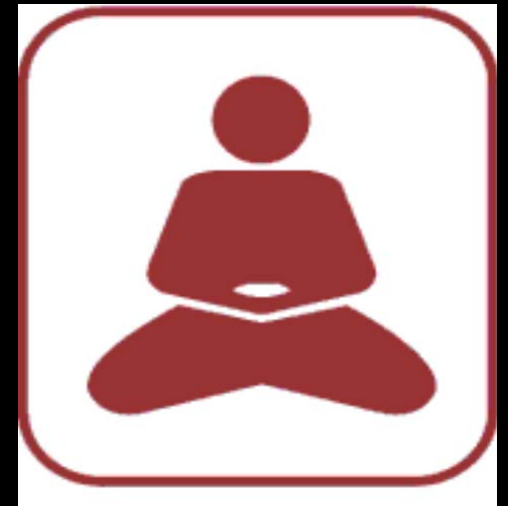
Is Environmental Control Helpful?

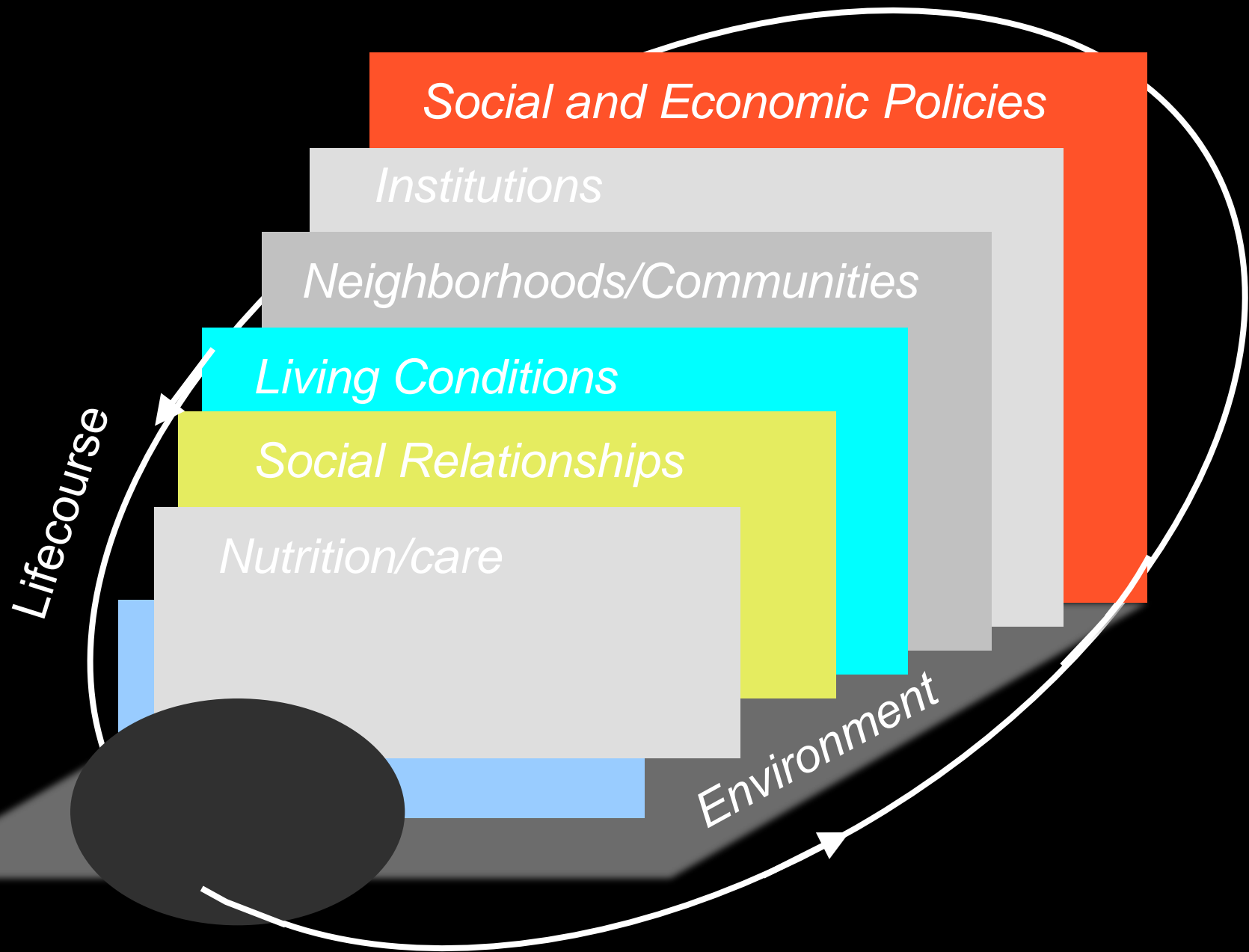


<http://health.allrefer.com/health/asthma-a-common-asthma-triggers.html>

Why not stress management?

1. Meditation
2. Laugh Out Loud
3. Play Soothing Music
4. Think Happy Things
5. Take a Short Walk
6. Slow/Deep Breaths
7. Relax Body
(Before/After Bed)





Collaborators

Channing Laboratory

Robert Wright

Marina Jacobson Canner

Diane Gold

Boston Children's

Michelle Bosquet Enlow

UMASS

John Staudenmayer

HSPH

Jonathon Levy

Joel Schwartz

Louise Ryan

Shakira Franco Suglia

Michelle Sternthal

Antje Kullowatz

Carnegie Mellon

Sheldon Cohen

SMU

Thomas Rtiz

